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2000 PBT Program Accomplishments

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"Pollutants that are persistent, bioaccumulative, and toxic have been linked to numerous adverse effects in humans and animals. The United States has taken extensive action over the years to address these pollutants. But such pollutants not only remain in the environment for years and even decades, they also travel far beyond their initial points of release, posing threats across national and geographic boundaries. Only by addressing the threat of these pollutants on a global scale can we help to meet our goal of leaving America's air cleaner, our water purer, and our land better protected."

—Christine Whitman, EPA Administrator

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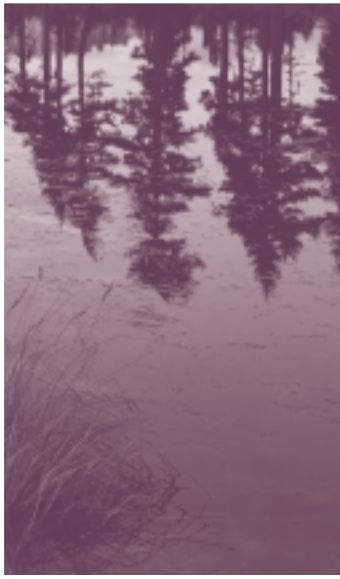


Overview

Introduction

>> In continuing its mission of protecting human health and the environment, the U.S. Environmental Protection Agency (EPA) launched the Persistent, Bioaccumulative, and Toxic (PBT) pollutants Program in November 1998. The PBT Program is an integrated approach addressing widespread problems associated with toxic pollutants that persist and bioaccumulate in the environment. This *2000 PBT Program Accomplishments* report demonstrates the Agency's PBT commitment by summarizing accomplishments made during the year 2000 to reduce the use and release of PBT pollutants while ensuring their proper disposal.

Pollutants such as mercury, polychlorinated biphenyls (PCBs), and some pesticides have persistent, bioaccumulative, and toxic characteristics and can pose significant national health and environmental concerns. PBTs are particularly difficult to address because of their ability to transfer rather easily among air, bodies of water, and areas of land. Once ingested by fish, birds, or mammals, many of these substances bioaccumulate and lead to body burdens well in excess of the ambient levels found in the environment. With frequent exposure over time, the amount of PBTs in an organism's tissue can build up and cause toxic effects. Human exposure to PBTs usually results from eating contaminated food. Once PBTs enter the human body, they can cause various adverse health effects, such as damage to the nervous and reproductive systems, and may lead to developmental problems and cancer. The type of effect and likelihood of these occurrences is attributed to the dose levels and toxic properties of the PBT pollutant. Young children and developing fetuses are especially at risk.

Most PBT releases occur in industrialized nations. However, these chemicals are reaching the Arctic via long-range transport. PBT levels in the Arctic region present a difficult problem because PBTs can persist longer there as a result of lower temperatures. Scientists expect levels of PBTs to rise in the Arctic, due to increased industrialization of that region and southeast Asia.[1]

PBT Program Status

Addressing PBT contamination requires a perspective that cuts across environmental media and geographic boundaries. It requires a holistic and integrated approach, using every Agency tool available—regulatory, compliance assistance, enforcement, research, voluntary actions, and international negotiations. Since its inception in 1998, the PBT Program has been committed to a process that will develop this perspective and an integrated approach. During its first year, it launched several initiatives, some of which have yet to produce formal quantified results[2]. In 2000, EPA raised the PBT Initiative to program status and featured it as a key cross-agency program in EPA's strategic plan.

National Action Plans

The PBT Program focuses on a list of 12 priority PBT pollutants (see Table 1). For each, the Agency is outlining a plan of action to reduce risks to human health and the environment. These priority actions and supporting assessments are embodied in reports called national action plans. These plans are being developed and reviewed through an Agency-wide process and are consistent with international efforts involving Canada, Mexico, and the United Nations. During 2000, EPA developed draft

[1]Bard, S.M. (1999). Global Transport of Anthropogenic Contaminants and the Consequences for the Arctic Marine Ecosystem. Marine Pollution Bulletin, vol. 38 (5), 356-379.
[2]For more information about past accomplishments, read or download the Agency's first annual edition, entitled, *EPA's Agency-wide Multimedia Persistent Bioaccumulative, and Toxic Pollutants Initiative: 1999 Accomplishments Report* on the Internet at: www.epa.gov/pbt/accomp99.htm.

Table 1. Priority Level-1 PBTs

- Aldrin/Dieldrin
- Alkyl-lead
- Benzo(a)Pyrene
- Camphechlor (Toxaphene)
- Chlordane
- Dichlorodiphenyltrichloroethane (DDT) (+DDD & DDE)
- Dioxins/Furans
- Hexachlorobenzene
- Mercury and Mercury Compounds
- Mirex
- Octachlorostyrene
- Polychlorinated Biphenyls (PCBs)

national action plans for alkyl-lead, a group of pesticides, hexachlorobenzene, and octachlorostyrene and requested comment on them from interested stakeholders and the public. The Agency also developed a comprehensive draft national action plan for mercury, which underwent public review in 1999.

The actions outlined in these national action plans are guiding the PBT Program. Moreover, at the request of Agency's senior managers, specific tasks associated with mercury, dioxins/furans, and PCBs are being given priority along with two cross-cutting efforts—monitoring and risk communication and outreach. It is for this reason that most of the accomplishments in this report are focused on these primary areas.

Organization of Report

EPA organized this 2000 accomplishments report around its four primary goals:

- **Preventing the introduction of new PBTs into the marketplace.** Chapter 1 examines preventive measures taken by EPA and industry partners to curtail the introduction of new PBTs into the marketplace.
- **Reducing risk to human health and the environment from exposure to priority PBTs already in the environment.** Chapter 2 describes accomplishments in 2000 on certain Priority Level-1 PBTs—namely, mercury, dioxins/furans, and PCBs.
- **Halting the transfer of PBTs among air, water, and land.** Chapter 3 explores steps taken by the Agency to develop an integrated approach toward addressing multiple PBT pollutants.
- **Assessing PBTs long-term effect on the environment.** Chapter 4 describes the Agency's efforts to monitor PBTs in the environment and measure their effects on human health.

The appendices provide additional resources, contact information, and an overview of future PBT Program activities.

Chapter 1: Preventing the Introduction of New PBT Chemicals into the Marketplace

>> EPA is strongly committed to preventing PBTs from entering the environment. Therefore, one of the first steps the Agency took under the PBT Program was to exercise its authority under the Toxic Substances Control Act (TSCA)[3] and issue a policy to strengthen the process by which it screens new chemicals intended for industrial markets. EPA also took the first steps to establish a similar policy for pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Finally, EPA developed a tool for use by manufacturers called the PBT Profiler. While the pesticide policy continues to be developed, the other two efforts have yielded outcomes in 2000.

- **Preventing the Introduction of New PBTs**. Under TSCA, chemical manufacturers are required by law to submit notifications called pre-manufacture notifications or PMNs to EPA for new chemicals they are planning to domestically manufacture or import on an industrial scale[4]. Using a sophisticated set of computer tools and scientific data, EPA evaluates a chemical's characteristics to ascertain whether it

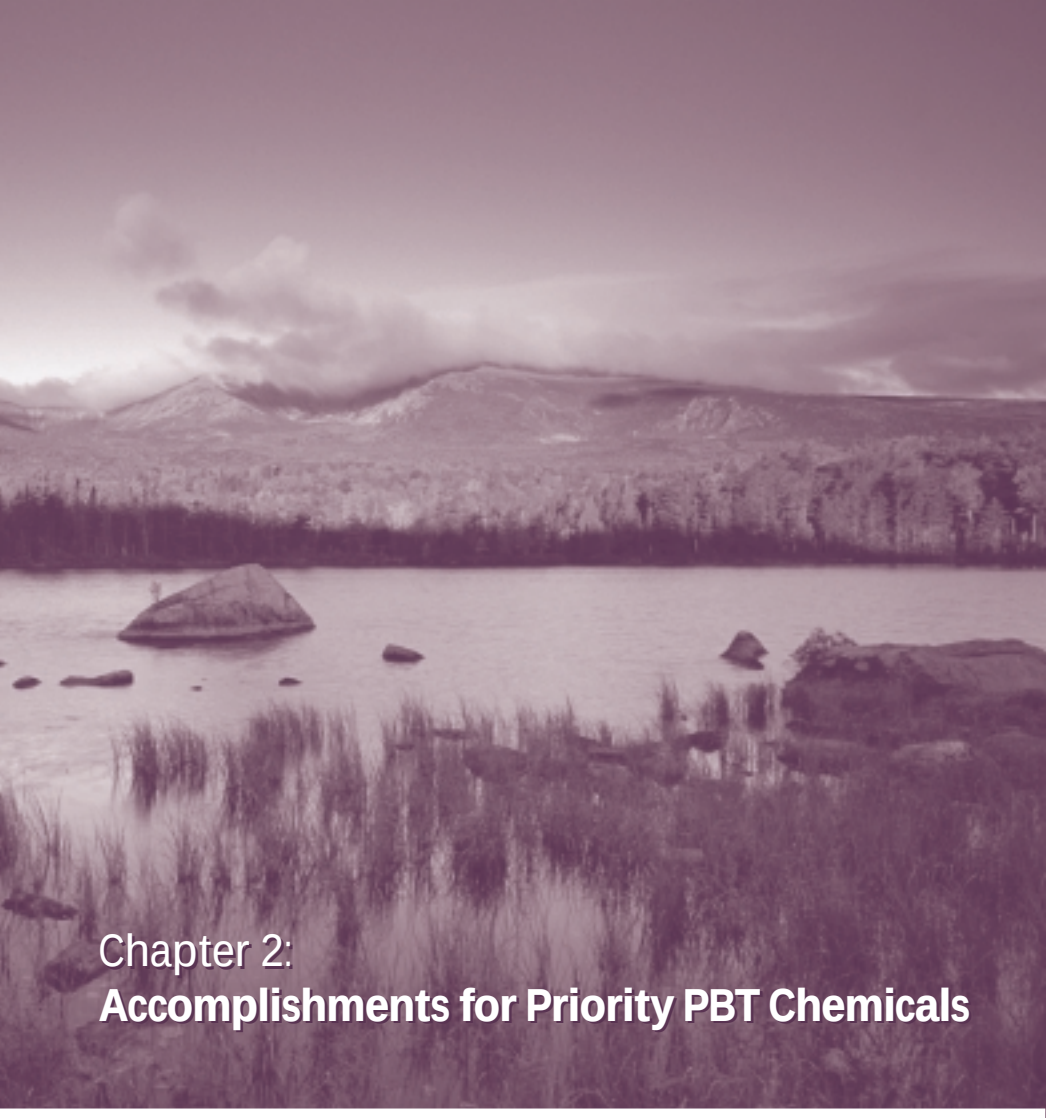
[3]In November 1999, EPA issued a policy statement under TSCA establishing a category for new persistent, bioaccumulative, and toxic (PBT) substances.
[4]These notices are authorized under the authority of Section 5 of TSCA.

might pose an unreasonable risk to human health or the environment. The new PBT policy establishes a special screen that isolates PMNs that possess PBT characteristics. These are then given special review. Based on these reviews, the Agency can stop the production of these chemicals until their prospective manufacturers can prove that they will not pose an unreasonable risk if released into the environment.

In 2000, EPA received 1,650 PMNs. Of these, EPA identified 53 notices with potential PBT characteristics, warranting further review. Upon closer scrutiny, seven PMNs were dropped from further review because EPA decided that they did not actually meet the PBT criteria. Production was banned for 11 PMN substances pending testing to refute any PBT concerns. Thirty-five PMN substances were allowed to be manufactured commercially but were specially regulated to control for their releases to the environment.

- **The PBT Profiler.** During the year 2000, EPA beta tested a new tool designed to put into the hands of chemical manufacturers the very tools that EPA uses in its PMN Program. This PBT Profiler is being developed as an online screening method that provides, at no cost to the user, estimates of whether a particular chemical possesses PBT characteristics. It is useful for evaluating the marketability of a "hypothetical" chemical when chemical-specific data are lacking. The goals of the PBT Profiler include (1) providing industry with risk-related information not previously available; (2) helping to inform their decision-making; and (3) promoting the design, development, and application of chemicals and processes that are safer for the environment.

  The PBT Profiler uses established screening models to estimate PBT characteristics based on chemical structure and physical and chemical properties. It predicts environmental persistence, bioconcentration potential, chronic toxicity in fish, characteristic travel distance, and half-life time spans in different environmental media. The model also compares these PBT predictions to EPA's regulatory criteria for PBT- related action under TSCA's New Chemical or PMN Program and under the Toxic Chemical Release Inventory (TRI) reporting thresholds. The PBT Profiler has successfully passed the beta-testing phase (approximately 20 companies used the model more than 2,400 times).



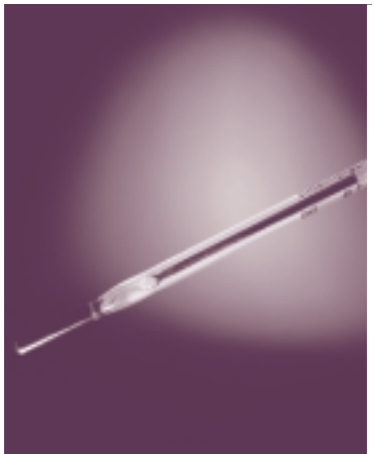
Chapter 2:
Accomplishments for Priority PBT Chemicals

>> In 2000, the PBT Program focused much of its energy on the priority PBT pollutants mercury, dioxins/furans, and PCBs. Each of these PBT pollutants presents a unique set of problems, and the Agency is using all of its available tools—regulations, compliance assistance, enforcement, research, voluntary actions, and international negotiations—to solve them. This chapter outlines key accomplishments from actions taken on these chemicals. It is important to note that this report does not attempt to capture each and every accomplishment made by the Agency and its regions with regard to these PBT pollutants.

Mercury

Reducing the risk to human health and the environment from exposure to mercury is one of EPA's most significant challenges. Just a small amount of mercury can contaminate an entire lake, making the fish unfit for human consumption and endangering nearby wildlife (e.g., loons, eagles, osprey). Furthermore, mercury released into the air from power plants, motor vehicles, incinerators, and other sources is

transported through the atmosphere and eventually deposited to land and water. When inorganic mercury enters an aquatic ecosystem, bacteria convert it to methylmercury. This organic-metallic compound is a very potent neurotoxin, which is a chemical compound that can have an adverse effect on the nervous system following exposure. This problem is made worse by the fact that there currently are limited options for the management of mercury-containing wastes and products. For example, the mercury that is collected through waste reduction activities or stored in central stockpiles is often simply recycled and returned to the marketplace. From the marketplace, the mercury will likely return again to the environment, perpetuating the problem. Another difficulty associated with mercury is its ability to travel long distances and contaminate areas far removed from the point of release. In fact, as much as 40 percent of the mercury deposited in the United States comes from outside our borders. Thus, to fully address mercury contamination, EPA must not only work on reducing mercury generated within the United States, but must also coordinate its efforts with its international partners. Through the PBT Program and the draft *National Mercury Action Plan*, EPA focuses its efforts on the following areas:



- Arresting or slowing the movement of mercury in the environment.
- Reducing the use and demand for mercury.
- Developing options for the disposal of wastes containing mercury.
- Developing international partnerships to further reduce mercury contamination.
- Communicating risks to lessen exposure.

Arresting or Slowing the Mobilization of Mercury in the Environment

Studies show that most of the mercury entering the environment is emitted to the air. EPA estimates that approximately 72 percent of these emissions originate from the following six sources: the burning of coal; the burning of municipal waste; the incineration of medical waste; the production of chlorine, the operation of motor vehicles; and the burning of hazardous waste. When mercury enters the air, it is not destroyed or eliminated from the natural environment but is merely converted into a vaporous form. Vapors of mercury and mercury compounds can contaminate a body of water by either settling directly onto the water's surface or by settling onto nearby land that drains into the water. Also, some forms of mercury are transported great distances before being deposited into the water or onto the land. Chapter 4 describes EPA's efforts to quantify results of efforts to reduce mercury and other PBT pollutants. In 2000, EPA accomplished the following tasks to facilitate the reduction of mercury released into the air, thereby protecting our nation's waters, human health, and wildlife.

- **Developing a policy to regulate mercury emissions from power plants.** One of the more significant outcomes for the Agency in 2000 was an announcement that it would regulate air toxic emissions from coal- fired electric utility plants—the largest source of mercury emissions in America. This decision, published in the Federal Register (65 FR 79825) on December 20, 2000, was based on data collected from utilities, existing and potential control technologies, results from the 1998 EPA Utility Air Toxics Study, and subsequent studies[5].
- **Studying the relationship between mercury air emissions and water quality.** Through a cooperative and voluntary effort, EPA's Air and Water programs are working together with the states of Wisconsin and Florida to study the relationship between mercury air emissions and water quality. Under these pilot projects, air and water modeling tools are being examined that could be used to support Total Maximum Daily Loads (TMDLs) for waters polluted by atmospheric mercury. In early 2000, a draft modeling report for the Florida pilot was prepared and underwent peer review. The draft results demonstrate how to couple an atmospheric deposition model with an aquatic cycling model in order to predict the relationship between deposition and mercury concentrations in fish. Preliminary results indicated an almost linear relationship between reductions in fish mercury concentrations and reductions in mercury deposition. The draft report also describes some of the data gaps and uncertainties that must be considered when using this approach.
- **Determining the routes by which mercury pollutes the Everglades.** EPA and the Florida Department of Environmental Protection (DEP) are collaborating on a project to identify and evaluate the sources and transport mechanisms that bring mercury into the Everglades. The team is collecting meteorological data, measuring the amount of mercury in the ambient atmosphere, and generating information on the dry deposition of mercury. EPA and the Florida DEP are incorporating these data into two biogeochemical models of atmospheric transport, deposition, and cycling of mercury in the Everglades. The first model focused on south Florida and used the "TMDL-Pilot modeling study." The second model incorporates dry deposition algorithms in a mercury module being developed as part of EPA Office of Research and Development Models-3/Congestion Mitigation and Air Quality national-scale modeling system.
- **Reducing mercury and dioxin/furan emissions from municipal combustors and medical incinerators.** EPA promulgated emission control regulations, based on maximum achievable control technology (MACT) for small Medical Waste Combustors (MWCs) in 2000. The same measures were taken in 1995 for large MWCs and in 1997

[5]Please see Appendix B.

for large Medical Waste Incinerators (MWIs). EPA expects that when the regulations are fully implemented, these sources will emit at least 90 percent less mercury, and will result in a more than 95 percent reduction in dioxin/furan emissions. Facilities with MWIs have until September 2002 to comply, and facilities with small MWCs have until December 2005. New MWC and MWI units are required to comply as soon as they start operating.

- **Evaluating the effects of abandoned mines on the San Francisco Bay environment.** More than 62,000 inactive or abandoned mines exist in Arizona, California, and Nevada. These mines have released tens of millions of pounds of mercury into western U.S. streams and rivers. Mercury leaches out of sediments and tailings during heavy winter and spring rains and flows downstream into rivers and lakes. This problem is exacerbated by bacteria that live in stream sediments and convert organic mercury into a more water-soluble toxic compound called methylmercury. Once converted into this more soluble form, mercury spreads more rapidly through rain and runoff and is more likely to be ingested or absorbed by organisms.

  EPA's Regional office in San Francisco, after conducting several studies to evaluate the effect of mercury on the San Francisco Bay environment, has concluded that mercury from abandoned mines is by far the biggest contributor to this water body. A major study of mercury methylation and bioaccumulation is now under way for the Bay-Delta area. The Agency is also participating in a multi-agency effort led by the United States Geological Survey (USGS) to characterize mercury contamination in the Bear River/Yuba River watershed. The effort is a 4-year program of monitoring mercury and methyl mercury levels in water, soil, amphibian, and fish tissue samples.

Reducing the Use and Demand for Mercury

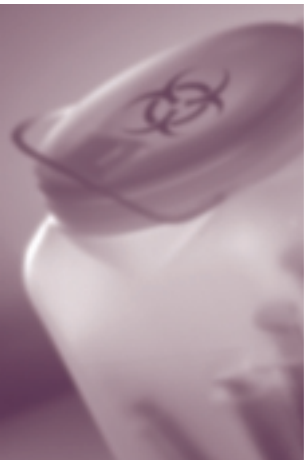
EPA and others have launched several projects to remove mercury from industrial, commercial, and consumer processes, operations, and products. Several of these have been directly supported through the PBT program, with state and local governments playing a central role. EPA supports state and local efforts by funding mercury reduction projects, providing information about mercury sources and reduction opportunities, and coordinating joint efforts. Several of these projects produced outcomes in 2000, including:

- **Demonstrating reduction of mercury use and release in iron and steel mills.** Three integrated steel mills in northwest Indiana—Bethlehem Steel Burns Harbor, Ispat Inland East Chicago, and U.S. Steel Gary—issued a mercury reduction plan outlining steps to reduce mercury use at their facilities. A draft report, entitled *A Guide to Mercury Reduction in Industrial and Commercial Settings,* summarizes the mercury inventory for each facility. The production of this report was part of a voluntary agreement among the mills, the Indiana Department of Environmental Management, EPA, and the Lake Michigan Forum[6]. As reported in this inventory and reduction plan, the mills identified approximately 1,000 pounds of mercury primarily in liquid storage and industrial equipment[7]. They committed to and achieved a reduction in the amount of inventoried mercury in their possession by one-third by the end of

[6]Please see Appendix B.
[7]Please see Appendix B.

2000. The reduction occurred primarily through the gradual phase-out and substitution of mercury-containing equipment and collection of liquid mercury in storage. EPA hopes this effort will encourage other mills to follow suit.

- **Reducing mercury emissions in the chlorine industry.** In 1996, the Chlorine Institute and a number of member companies that operate mercury-cell chlor-alkali factories announced a goal of voluntarily reducing industrial consumption and air emissions of mercury by 50 percent within a decade. In 2000, the industry achieved this goal. The overall reduction in 2000 was nearly 51 percent. After adjusting for shutdown facilities, the reduction in mercury use by the other chlor-alkali industry is 44 percent compared with the baseline of the early 1990s.
- **Achieving notable reductions in mercury releases from hospitals.** EPA has collaborated with the American Hospital Association, Health Care Without Harm, and most recently the American Nurses Association to create a voluntary program called Hospitals for a Healthy Environment or H2E. As an H2E participant hospitals and health care facilities pledge to eliminate mercury use by 2005 and reduce overall hospital waste by 50 percent by 2010. In 2000, H2E received numerous pledges from hospitals in support of the H2E goals. While the H2E program is still maturing, the response to its principles and goals has been overwhelming. Several hospitals have already met the H2E goals. Others are aggressively working to achieve them. For example, Jacobi Medical Center in New York cut annual waste management costs by 30 percent, and P2 efforts by Staten Island University Hospital reduced waste management costs by $500,000 per year. St. Barnabas Hospital in New Jersey reduced waste volume by 65 percent and costs by 50 percent, and one medical center financed renovations of a research lab with savings realized by reducing waste.



H2E on the Internet-www.h2e-online.org

What people are saying about the H2E program:

- "Many hospitals have deepened or begun P2 programs purely because of the H2E program."
- "Environmental awareness in health care began and has been growing as a result of the H2E program."
- "Thanks to the H2E, goals like mercury elimination are now perceived as worthwhile and achievable."
- "The work done to date and resources provided via the H2E Web site are invaluable to hospitals like ours."

Developing Options for the Disposal of Wastes Containing Mercury

EPA is currently researching safer alternative options for managing mercury wastes. This research seeks technologies that will effectively lock mercury into a solid matrix from which it can not easily escape (i.e., technologies that would "stabilize" mercury). It is a collaborative effort shared by the EPA Office of Solid Waste (OSW), the EPA Office of Research and Development (ORD), and the Department of Energy (DOE). EPA anticipates that this research will yield data on alternative treatment technologies for mercury-containing wastes and will also describe the conditions under which the various treatment process residues will remain stable in landfills. EPA expects that some of these technologies will enable the government to treat existing stockpiles of elemental mercury, including those of the Department of Defense (DoD) and those of chlor-alkali facilities that have closed or switched away from the mercury cell process. DoD is preparing an environmental impact statement describing its plans for long-term management of its mercury stockpile. It will be considering treatment technologies as a strategy for managing this stockpile.

Developing International Partnerships to Reduce Mercury Contamination

To address the global extent of the mercury problem, EPA conducted the following efforts in 2000 with its international partners:

- **Researching on how mercury moves through the environment.** EPA knows that mercury persists in the environment and can travel long distances. It is less sure what physical transformations occur as mercury travels around the globe. EPA, through its Science To Achieve Results (STAR) grants program, is supporting basic research on the complex chemical and physical transformations of mercury as it moves throughout the environment and across international borders. In 1999, EPA awarded nine grants totaling approximately $7 million to improve the Agency's ability to trace mercury from its entrance into the ecosystem to its accumulation as methylmercury in fish tissue. In 2000, EPA received status reports from grantees as they began implementing their projects.
- **Coordinating mercury reduction efforts in North America.** Canada, Mexico, and the United States developed a North American Regional Action Plan (NARAP) to collaborate on mercury reduction throughout the North American continent. Phase II of NARAP, completed in June 2000, identifies activities that address the reduction of mercury use and release. Phase II of NARAP also has provisions dealing with information exchange, education, and data compatibility among the participating countries. EPA represents the U.S. in this effort and is responsible for implementing most of the actions. It is also responsible for coordinating activities among

other U.S. federal agencies. The actions identified in the Mercury NARAP are consistent with those presented in the draft *National Mercury Action Plan*.

- **Assessing the effects of mercury on the Arctic Environment.** The National Oceanic and Atmospheric Administration (NOAA), the Department of Energy (DOE), and EPA collaborated on a project to collect ambient measurements of different chemical forms of mercury in the Arctic (Barrow, Alaska). The measurements will be part of an international effort to characterize and understand how mercury travels across geographic boundaries. The effort will also focus on how mercury is deposited in the Arctic and what happens to the mercury after it has been deposited.
- **Evaluating the trans-Pacific transport of mercury.** EPA is collecting measurements at Cheeka Peak, Washington, to identify and evaluate the trans-Pacific transport of mercury and other pollutants in air masses that originate in Asia (e.g., forest fires in Indonesia). EPA will also soon begin collecting similar measurements at a high-altitude site on Mauna Loa, Hawaii. Besides helping with long-range research on mercury transport, the measurements from this study will serve as a global benchmark record for mercury and will enhance EPA's understanding of the transformation of elemental mercury to reactive gaseous mercury.

Communicating Risks to Lessen Exposure

To communicate mercury risks and lessen exposure, EPA conducted the following activities in 2000:

- **Protecting the public through fish consumption advisories.** In 2000, mercury, PCBs, chlordane, dioxins, and DDT were at least partially responsible for 99 percent of all fish consumption advisories in the United States. As of December 2000, 41 states have established fish advisories for mercury, and a total of 2,242 advisories in the United States were at least in part due to mercury contamination of fish tissue. Thirteen states have issued advisories for all lakes and/or rivers in their state, and another nine states have statewide advisories for mercury in their coastal waters. During 2000, EPA's Office of Water provided states with technical assistance in the development of these advisories. Raising awareness through the consumption advisories is a necessary first step. Educating the public on how to react to these advisories is equally important. To this end, the Office of Water compiled all advisories across the states and listed them on its Web site. The Office of Water also developed brochures for distribution by physician's offices. These documents are available for viewing, downloading, and printing from its Web site <www.epa.gov/ost/fish>.
- **Funding state outreach and communication efforts.** In 2000, EPA supplied nearly $1 million in funds to state programs to reduce mercury consumption and educate the public about its dangers. Projects included thermometer exchanges, seminars for the health care industry, and general public outreach and education efforts (e.g. exhibits, brochures, newsletters, promotional materials).
- **Creating Web sites to relay information on mercury.** EPA established a mercury Web site at <www.epa.gov/mercury

as well as www.epa.gov/pbt> to educate the public about mercury dangers. The mercury Web site includes fact sheets on mercury, answers to frequently asked questions, resources, and advice on what to do. The Agency's PBT Web site includes the draft *National Mercury Action Plan*.

- **Producing a video on the health care industry and waste management.** Working with EPA, the University of Vermont produced *Our Waste, Our Responsibility,* a 20-minute video designed to increase awareness about the dangers of mercury and impact of other hospital wastes on the environment. The video, designed for hospital administrators, facility managers, and employees, provides pollution prevention solutions and illustrates how key stakeholders are achieving success in this critical area. To date, EPA and its partners have distributed hundreds of copies of the tape.

Dioxins/Furans

Dioxins are a group of toxic substances that scientists collectively refer to as polychlorinated dibenzo-p-dioxin (PCDD or dioxin). Closely related to dioxins are a family of substances known as polychlorinated dibenzofurans (PCDFs or furans). Dioxins and furans have become ubiquitous in the environment, mainly due to human activities, and can pose various short-term and long-term health risks to humans. Various forms of combustion (ranging from energy production to backyard trash burning) result in the formation and subsequent release of these chemicals—primarily to the air. Once airborne, dioxins and furans can be carried for long distances until they come to rest on plants used as feed for livestock or in rivers and lakes where they may contaminate fish. Humans are usually exposed to dioxins and furans through food consumption, namely from eating contaminated fish, meat, and dairy products.

During 2000, EPA worked on a scientific reassessment of dioxin/furans. In support of this reassessment, the PBT Program provided funding for the following research and pilot projects.

- **Measuring airborne PBTs in Oklahoma City.** In 2000, EPA initiated a joint study, along with the Oklahoma Department of Environmental Quality (DEQ), to characterize the levels and distribution of dioxins, furans, and PCBs in the ambient air of certain urban areas. The Agency collected samples in Oklahoma City, Oklahoma and has analyzed the first round of sampling data.
- **Establishing dioxin monitoring stations in Alaska and Oregon.** EPA collects fate and transport information for dioxins/furans though a network of monitoring stations called the National Dioxin Air Monitoring Network (NDAMN). In 2000, EPA expanded NDAMN by adding air monitoring stations in Alaska and Oregon. NDAMN is investigating the potential for long-range transport of dioxins, furans, and dioxin-like PCBs from Asia to North America. During 2000, NDAMN provided essential informa-

tion that has helped EPA trace wind flow patterns from the Asian continent.

- **Educating consumers on the harm associated with backyard barrel burning.** Implementation of EPA regulations to control emissions from the combustion of municipal and medical waste is expected to significantly reduce dioxin emissions to the air. However, dioxin emissions still occur from other incineration processes—one of the largest is the burning of trash, especially in backyard barrels. With grant assistance from EPA, Minnesota and Wisconsin established a committee to educate residents about the harmful effects of burning trash. In 1999, the committee completed a survey evaluating whether people knew that it was harmful to burn trash. More than a quarter (27.5 percent) said they currently use a burn barrel or other device to burn household garbage or other materials. In 2000, the committee launched an advertising campaign emphasizing the dangers that burning outdoor trash pose to the air, water, and soil. Although it is too early to measure the impact of this campaign, EPA hopes that positive developments made in these two states can be broadened to other states where barrel burning is practiced.
- **Monitoring dioxin contamination in the San Francisco Bay area.** EPA's Regional office in San Francisco launched a coordinated strategy for the San Francisco Bay, in response to the listing of the Bay as impaired due to dioxins and PCBs under the Clean Water Act Section 303(d) program. This strategy includes: monitoring for dioxins in Bay water, sediment, and commercially available fish; ambient air monitoring; research into alternatives to incineration at Superfund cleanup sites; pollution prevention projects focusing on reducing medical waste sent for incineration; grant support for community-based dioxins pollution prevention projects; and a comprehensive outreach effort to engage stakeholders in addressing dioxin issues in the Bay area. For more information, see <http://dioxin.abag.ca.gov>.

PCBs

PCBs are a group of synthetic organic chemicals that were manufactured in large quantities in the United States from 1929 until the ban of their manufacture in 1979. They were widely used in electrical equipment, hydraulic fluids, and heat-conducting fluids. They were also used in a variety of consumer products. PCBs are also inadvertently generated as a byproduct of certain combustion and chemical processes. PCBs are very persistent in the environment, and can be found in aquatic wildlife at concentrations a million times greater than the concentration in the surrounding water. Electrical transformers and capacitors are the primary source of high-concentration PCBs. Through the 1997 Binational Toxics Strategy with Canada, the United States committed to a voluntary phasing out or decommissioning of 90 percent of its PCB transformers and capacitors by 2006. PCB-contaminated sites and sediments probably account for the vast majority of PCB contamination affecting the food chain and, thus, human and wildlife exposure.

The following is a list of the PCB-related projects that the PBT Program supported in 2000:

- **Partnering with automobile manufacturers to eliminate PCB-containing electrical equipment**. EPA continued to work with General Motors, Daimler/Chrysler, and Ford on phasing out PCB transformers. In 2000, General Motors voluntarily eliminated PCB transformers at all of its U.S. and Canadian facilities. Daimler/Chrysler eliminated 100 percent of its PCB transformers and 99 percent of its PCB capacitors at all of its facilities and plans to remove the remaining PCB capacitors.
- **Partnering with utilities to eliminate PCBs.** In 2000, EPA's Regional office in Chicago and EPA's Office of Enforcement and Compliance Assurance (OECA) jointly developed a self-disclosure policy for companies that voluntarily agree to phase out their remaining PCB transformers, capacitors, and voltage regulators within a set time period. In November 2000, the regional office sent letters to 11 major electric utilities in the Great Lakes area, seeking the utilities' voluntary commitments to decommission their remaining PCB electrical equipment. The letters also encourage the utilities to participate in the self-disclosure policy.
- **Evaluating the Federal government's use of PCBs.** With funding from the PBT Program, EPA's Regional office in Chicago initiated a pilot project in 2000 to reduce the amount of PCBs present in the electrical equipment owned and operated by the federal government. During 2000, the project identified those federal facilities that own electrical equipment with high concentrations of PCBs (greater than 500 parts per million). The federal government is the single largest owner of PCB transformers[8]. Approximately 62 federal facilities have a total of 2,215 PCB transformers registered nationally, or a little more than 10 percent of the PCB transformers registered in the country. The inventory also identified the primary agencies registering PCB transformers. These agencies include: the Tennessee Valley Authority (TVA), Department of Defense (DoD), Department of Energy (DOE), and the Department of Transportation (DOT).
- **Assisting partners inventory PCB sources in the Russian Federation.** In October 2000, the United States and the seven other nations bordering the Arctic completed work on the first phase of a U.S.-initiated project to help the Russian Federation stop using PCBs. The project involved developing the first-ever openly available inventory of PCBs in Russia. This inventory includes production sites and volumes, major uses, estimates of PCB wastes, and estimates of PCB releases. Although the inventory was not as comprehensive as originally intended (e.g., it did not account for PCB production and use in the Russian military sector), the inventory clearly shows the magnitude of the PCB management problems Russia faces. Moreover, the inventory suggests that Russian PCB releases could enter the Arctic environment and then reach the United States and other nations via long-range transport.

[8]Please see Appendix B.

Chapter 3:
Integrating PBT Efforts at EPA

>> While EPA's PBT Program is focusing on priority pollutants such as mercury, PCBs, and dioxins/furans, it recognizes that rarely do point sources of pollution release these chemicals alone. Most sources, especially those using combustion processes, may be releasing multiple PBTs. Consequently, as part of the PBT Program, the Agency continually looks for ways to address clusters of PBTs, especially geographically or within individual sectors. Examples of integrated efforts implemented by EPA in 2000 include:

- **Removing pesticides from the environment.** The Agency has continually supported states, tribes, and local government efforts to dispose of agricultural pesticides by developing collection and disposal programs, commonly known as Clean Sweep programs. The Agency continues to supply technical assistance, helping resolve regulatory issues and barriers, while identifying options for financing Clean Sweep programs, supporting program outreach, and facilitating the collection of pesticides from households and urban businesses. From 1988 through 2000, Clean Sweep programs have collected and disposed of more than 23.7 million pounds of old pesticides and ensured the proper management and disposal of these materials.

Table 2. Estimated Amount of Pesticides Collected and Disposed by Clean Sweep Programs

Pesticide	Estimated total amount collected and disposed of in the U.S. (pounds)*
DDT	914,800
Toxaphene	706,300
Chlordane	346,000
Mercury **	326,600
Aldrin	151,700
Dieldrin	113,800

*Based on limited data regarding quantities of specific pesticides, EPA estimates that the following amounts of pesticides have been collected and disposed of nationwide from 1988 through 2000.
** While elemental mercury is not considered a pesticide, some pesticides do contain mercury compounds.

- **Analyzing the PBT content in traditional foods of Native Alaskans.** In 1999, a partnership was formed between the Alaskan Tribes, the Alaskan Native Marine Mammal Commissions, the Alaska Sea Life Center, the Manchester Laboratory, and the Office of Environmental Assessment in EPA's Regional Office in Seattle. The purpose of this partnership is to test and analyze the foods that Native American's obtain from the wild in Alaska. In 2000, the PBT Program: (1) established a field sampling protocol along with a field kit that helps tribes collect samples; (2) trained Native Americans in sample collection by teaching them to adhere to a tribally developed quality assurance project plan, which was approved by EPA in November of 2000; and (3) developed a prototype PBT screening tool to help Alaskan Tribes predict (based on a statistical model) the presence or absence of PBTs in Herring gull eggs within Southeast, South Central and Northwest Alaska. In December 2000, the program sent herring gull eggs from 50 Alaskan tribes to two labs for an analysis of the presence and distribution of selected PBTs: one is a Fish and Wildlife laboratory for analyzing for metals; the other laboratory in British Columbia analyzes selected organic chemicals.

- **Encouraging boiler operators to reduce PBT emissions.** EPA funding helped the Delta Institute and the Council of Industrial Boiler Owners (CIBO) develop a voluntary program to reduce emissions of PBTs in the Great Lakes region. Non-utility boilers, internal combustion engines, and gas-fired turbines producing thermal and/or electric energy are the second-largest source of mercury, the fifth-largest source of PCBs, and the seventh-largest source of dioxins and furans. Nevertheless, these facilities are critical to the industrial economy of the Great Lakes region, and it is expected that they will play an even greater role in meeting the demands of a deregulated energy marketplace. Although electric utility boilers produce a larger quantity of toxic air pollutants than do industrial boilers, industrial boilers may have a disproportionately large impact on the local environments. The Delta Institute and CIBO launched the voluntary program in March 2000. This project targeted two types of facilities: boilers owned and operated by public sector authorities and large industrial facilities. In partnership with the state of Wisconsin, the Delta Institute conducted two outreach meetings; created a resource manual addressing significant issues raised by initial project advisors; and compiled background materials and resources into a workbook covering energy efficiency options, incentive programs, pollutants of concern, and tools and methods for quantifying the benefits of energy efficiency. In November 2000, the Delta Institute began auditing industrial boilers (in both the public and private sector) and reporting findings, aggregated across facilities. They asked audit participants to report on what recommended energy efficiency methods and technologies they did or did not implement and why. The Delta

Institute will report on participant results, including actual and potential PBT emissions reductions, including mercury, dioxins, and metals like cadmium.

- **Sampling PBT levels in the U.S. milk supply.** In 2000, EPA developed analytical methods for measuring trace levels of various PBTs within milk. The Agency collected milk samples from about 40 large dairy plants at locations across the country to determine the levels of dioxins, PCBs, and other PBTs in cow milk. These samples were collected through a national network of monitoring locations in 41 states representing roughly 20 percent of the U.S. milk supply.

Chapter 4: **Measuring the Progress of the PBT Program**

>> EPA measures the progress of the PBT program through: (1) environmental health and human indicators; (2) chemical release, waste generation, or use indicators; and (3) programmatic output measures. In 2000, EPA made significant improvements to the way PBTs are monitored and measured. This chapter demonstrates how the Agency has promoted a better understanding of PBTs in our environment by way of regulatory action, collaborative partnerships, and through scientific research.

- **Reporting Thresholds Lowered for 18 PBTs.** During 2000, companies subject to Toxic Release Inventory reporting began tracking pollutants to meet the statutory criteria for persistence and bioaccumulation (64 FR 58666). EPA began requiring this tracking with the October 29, 1999, final rule that lowered the Toxic Release Inventory (TRI) reporting thresholds for 18 chemicals and chemical categories. The current PBT chemicals and their reporting thresholds are listed in Table 3.

  EPA also developed four guidance documents for the TRI PBT chemicals. These document are available at the TRI home page (http://www.epa.gov/tri/). These documents are titled: 1) *Dioxin and Dioxin-like Compounds Category; 2) Mercury and Mercury Compounds; 3) Pesticides and Other PBT Chemicals; 4) Polycyclic Aromatic Compounds.*

- **National Health and Nutrition Examination Survey (NHANES).** Funding from the PBT Program contributed to the generation of the fourth Department of Health and Human Services (HHS) NHANES data set in 1999. This data set is the only source of national-scale information on mercury levels in human tissue (blood and hair) samples. The survey is the first national collection of baseline measurements for mercury in humans. The NHANES data indicate that approximately 10 percent of women of childbearing age have blood mercury concentrations above the levels EPA considers safe [i.e., levels above the EPA Reference dose (RfD)][9]. Children born of women with blood mercury levels

[9]The toxicity value for evaluating noncarcinogenic effects resulting from exposure.

above the RfD are more likely to have lower IQs (e.g., under 70—a number generally associated with developmental problems and poor school performance). Earlier estimates by the National Academy of Sciences (NAS) showed that 60,000 newborns each year were at risk of suffering developmental problems as a result of methylmercury exposure. Based on the NHANES 1999 data, the estimated number of newborns per year at risk of developmental problems resulting from in utero methylmercury exposure are now estimated to be close to 400,000.[10]

- **Alaskan Native Fetal Cord Blood Monitoring Program.** Funding from the PBT Program supported the Alaskan Native Fetal Cord Blood Monitoring Program. This program focuses on health of mothers and their children, paying close attention to maternal and fetal exposure to chemically contaminated foods during pregnancy. In 2000, the pro-

[10]Study results can be found in the March 2, 2001, Morbidity and Mortality Weekly Report.
[11]Benzo(j,k)fluorene and 3-methylcholanthrene were specifically added to the PACs compound category.

Table 3. Reporting Thresholds for TRI Listed PBT Chemicals

Chemical Name or Chemical Category	Chemical Abstracts Service Reference Number (CASRN)	Section 313 Reporting Threshold (in pounds unless noted otherwise)
Aldrin	309-00-2	100
Benzo(g,h,i)perylene	191-24-2	10
Chlordane	57-74-9	10
Dioxin and dioxin-like compounds category	NA	0.1 grams
Heptachlor	76-44-8	10
Hexachlorobenzene	118-74-1	10
Isodrin	465-73-6	10
Lead	007439-92-1	100
Lead compounds	NA	100
Mercury	7439-97-6	10
Mercury compounds	NA	10
Methoxychlor	72-43-5	100
Octachlorostyrene	29082-74-4	10
Pendimethalin	40487-42-1	100
Pentachlorobenzene	608-93-5	10
Polycyclic aromatic compounds category (PACs)[11]	NA	100
Polychlorinated biphenyl (PCBs)	1336-36-3	10
Tetrabromobisphenol A	79-94-7	100
Camphechlor (Toxaphene)	8001-35-2	10
Trifluralin	1582-09-8	100

gram set out to monitor selected heavy metals and persistent organic pollutants (including lead, mercury, PCBs, and others) in the umbilical cord blood and maternal blood of Inupiat and Yupik women within two geographic regions. These two regions are associated with the Arctic Slope Native Association and the Yukon-Kuskokwim Health Corporation. Laboratory analysis of the samples collected from these regions has been completed and the resultant data are currently being examined by program investigators.

- **National Fish Contamination Tissue Study.** A 4-year National Fish Tissue Study began in 2000. The study is being managed by EPA's Office of Water and is expected to produce a wealth of data about the largest group of PBT chemicals studied in fish to date. The data set includes all of the Level-1 PBT chemicals except alkyl-lead. The fish tissue study is the first one to use a random sampling design on a national level. The study's data will allow EPA to develop national estimates of the mean levels of individual PBT chemicals in fish tissue. The study addresses a critical data gap—it defines background levels for PBT chemicals in fish. The study will also characterize the prevalence of these chemicals in fish on a national scale. To date, participating states and EPA Regions have collected fish from 144 lakes in 40 states and have sent 290 fish samples for laboratory examination.

Appendix A: **Resources**

This is only a partial listing of available resources. The listing of non-EPA Web sites does not constitute an endorsement by EPA or its partners.

Resource Topic	Information	Location
PBT (General)		
For up-to-date national information on PBTs, visit EPA's Office of Pollution Prevention and Toxics (OPPT) PBT Program Web site.	One can find a wealth of information on EPA initiatives, goals, regulatory activities, voluntary partnerships, and links to technical materials and/or environmental/health effects associated with PBTs.	www.epa.gov/pbt
Mercury		
Binational Toxics Strategy Mercury Workgroup	This site provides an abundant resource of information about the mercury workgroup and information on the health and environmental effects of mercury.	www.epa.gov/Region5/air/mercury/mercury.html
EPA's Mercury Web Site	This site provides background information, Agency actions taken on mercury, fish advisory information, as well as downloadable research and technical materials.	www.epa.gov/mercury
EPA's Mercury Research Strategy	The site provides a guide to EPA's Office of Research and Development (ORD) mercury research program, addressing immediate strategies, and goals covering EPA's fiscal year 2001 – 2005 time frame.	www.epa.gov/ORD/NRMRL/mercury
Hospitals for a Healthy Environment	This site provides background information, initiatives, and goals of EPA's cooperative effort with the American Hospital Association (AHA) to eliminate mercury from medical waste.	www.h2e-online.org
Dioxins		
Enviro Web's Dioxin Home Page	This site offers a wide range of information from health to political action dioxin Web sites.	www.ejnet.org/dioxin
National Center for Environmental Assessment's Dioxin and Related Compounds	This site from EPA's Office of Research and Development (ORD) offers a full spectrum of information from frequently asked questions about dioxins and similar compounds to regulatory actions and initiatives.	www.epa.gov/ncea/dioxin.htm

Bay Area Dioxins Project	This site provides updated information on the San Francisco Bay area project; participating state, local, and regional agency involvement; as well as other pertinent information.	dioxin.abag.ca.gov
PCBs		
EPA's Office of Pollution Prevention and Toxics (OPPT) PCB Home Page	This site offers a wide range of background and health-related information on toxic pollutants, current regulatory activities, and guidance materials, as well as information for waste handlers and Web links to other related Agency efforts.	www.epa.gov/oppt/pcb
Additional Sites		
Great Lakes Binational Strategy	This site details the various activities of EPA and Environment Canada to eliminate PBTs from the Great Lakes region, as well as the activities of representatives from the Great Lakes states, the Province of Ontario, and other federal agencies within Canada and United States.	www.epa.gov/glnpo/bns
Great Lakes National Program Office	This site provides extensive information on EPA's activities, strategies, and long-term goals within the Great Lakes region.	www.epa.gov/glnpo
Waste Minimization National Plan	This site provides background information on how hazardous wastes, namely PBTs can effectively be reduced at the source using pollution prevention approaches.	www.epa.gov/epaoswer/hazwaste/minimize
EPA's Toxic Release Inventory Home Page	This site provides extensive information on toxic chemicals that are being used, manufactured, treated, transported, or released into the environment by select industries across the nation.	www.epa.gov/tri
National Fish and Wildlife Contamination Program, EPA's Office of Water	This site provides extensive information on fish advisories in federal, state, and tribal areas; health information, and outreach materials on fish consumption related to mercury and PBT contamination.	www.epa.gov/ost/fish
Washington State Department of Ecology's Initiative on Bioaccumulative Chemicals of Concern	This site provides a wide range of information on Washington state's PBT initiatives and goals.	www.ecy.wa.gov/programs/eap/pbt/pbt faq.html

Appendix B: **References and Contacts**

Resource Topic	Information	Location/Contact
PBT (General)		
EPA's Agency-wide Multimedia Persistent, Bioaccumulative, and Toxic Pollutants Initiative: 1999 Accomplishments Report	More information about past accomplishments.	www.epa.gov/pbt/accomp99.htm
Mercury		
Regulating mercury emissions from power plants	Information on EPA's Utility Air Toxics Study.	www.epa.gov/mercury
	Chlorine Industry 4th annual report to EPA.	www.epa.gov/region5/air/mercury/4thc l2report.html
The iron and steel industry reduces mercury use and releases	Copy of the iron and steel industry draft report.	Steve Skavroneck at cranehousesp@msn.com
	Copy of the voluntary agreement reached by the steel mills and the Department of Management, EPA and the Lake Michigan forum.	www.lkmichiganforum.org/mercury/me rcfinal.pdf
Dioxins/Furans		
General	More general information.	www.epa.gov/ncea/dioxin.htm
Educating consumers on the practice of barrel burning	Further information or a copy of the survey.	Joan Weyandt-Fulton at 218 722-3336, Ext. 334, or joan.weyandt@wlssd.duluth.mn.us
Monitoring dioxin contamination in the San Francisco Bay area	More information.	Waste Management Division, EPA San Francisco, 415 744-2113
PCBs		
General	More general information about PCBs.	www.epa.gov/opptintr/pbt
Reducing the federal government's use of PCBs	More information on EPA's Transformers Registration Database.	www.epa.gov/opptintr/pcb/xform.htm

Taking inventory of PCB sources in the Russian Federation	Further information.	International Activities, Office of International Environmental Policy, 202 564-6600 Office of Pollution Prevention and Toxics, Office of Prevention, Pesticides and Toxics Substances, 202 260-1866

Integrating PBT Efforts at EPA

Removing pesticides from the environment	More information about Clean Sweep programs or to obtain information that the Agency has compiled.	Office of Pesticide Programs, 703 305-7090

Measuring the Progress of the PBT program

Alaskan Native Fetal Cord Blood Monitoring Program	Further information.	Office of International Environmental Policy, 202 564-6600
National Fish Contamination Tissue Study	Further information.	Standards and Health Protection Division, Office of Science and Technology, 202 260-7301

Appendix C: **Future Outlook**

EPA and its partners will continue to use all available tools to prevent the introduction of new PBTs into the marketplace, reduce risks of PBTs already in the environment, and stop the transfer of PBTs from one environmental medium to another. Future activities that build on projects disclosed in this 2000 report include:

Preventing New PBTs From Entering the Marketplace

- Completing a peer review of the PBT Profiler.
- Developing a policy to strengthen the process the agency uses to screen newly-developed pesticides prior to their production and introduction to the marketplace.

Reducing Risks Associated with Existing PBTs and Halt the Transfer of PBTs

- Revising the methylmercury waste criterion facilitating the development of more stringent effluent limitations. The new criterion will reflect the most up-to-date practices in environmental science and risk assessment.
- Proposing hazardous air pollutant (HAP) emissions regulations in 2003 and 2004 to further regulate mercury emissions from power plants.
- Continuing to work with iron and steel mills to demonstrate reductions of mercury use and release. Participating facilities committed to a reduction in the amount of inventoried mercury in their possession by an additional one-third by the end of 2004. Their ultimate goal is to achieve a 90 percent reduction for the end of 2008.
- Releasing findings on the relationship between mercury air emissions and water quality. Florida will release a final modeling report in late 2001. Wisconsin will release results from the pilot project in 2002.
- Continuing sampling airborne PBTs in Oklahoma City in 2001 to characterize the levels and distribution of dioxins, furans, and PCBs in the ambient air of certain urban areas.
- Establishing two additional air monitoring stations in Alaska and Oregon by the end of 2001 to further the investigation of the potential for long-range transport of dioxins, furans, and dioxin-like PCBs from Asia to North America.
- Continuing to work with General Motors, Daimler/Chrysler, and Ford on phasing out PCB-containing electrical equipment. Ford expects to decommission 95 percent of the high-level PCBs it uses in its electrical equipment worldwide by 2006. It expects to decommission 100 percent of this material by 2010.
- Expanding the PCB partnership with utilities to include additional facilities within the Great Lake region. The partnership seeks voluntary commitments from utilities to decommission their remaining PCB electrical equipment.
- Beginning a 2-year effort that will attempt to determine how to replace PCBs and PCB-contaminated equipment still in use in the Russian Federation. This effort will also seek new ways to properly manage PCB wastes, destroy PCBs, and decontaminate PCB-containing equipment.

Measuring Success of the PBT Program

- Completing analysis and release results from the study of the presence and distribution of selected PBTs in the herring gull eggs from 50 Alaskan tribes in 2001.

- Completing analysis of the levels of dioxins, PCBs, and other PBTs in cow milk samples collected from about 40 large dairy plants at locations across the country by the end of 2001.
- Collecting reports from companies meeting threshold requirements for the 18 PBTs (due by July 1, 2001). Analyze the reports and make findings available in 2002.
- Issuing a final rule pertaining to lead and lead compounds in 2001. This rule lowers the EPCRA Section 313 reporting threshold for lead and lead compounds to 100 pounds (with certain exceptions).
- Including the Manillaq Association and the Aleutian/Pribilof Island Association in the Alaskan Native Fetal Cord Blood Monitoring Program. The program is scheduled to perform a dietary survey and create data sets for each organic and heavy metal pollutant that is a problem in Alaska. The program will also search for significant associations between chemical exposure and health outcomes. Program investigators will share their data and results with their collaborators and with Alaskan Native communities.
- Completing analysis of the levels of individual PBT chemicals in fish tissue in the first set of fish samples from the National Fish Contamination Tissue Study by summer 2001. During 2001, the study participants are scheduled to sample up to 150 additional lakes. The 4-year goal for the study is to sample a total of 500 lakes. Once the study is completed, the data will be made available to the public through EPA's Storage and Retrieval (STORET) database system.

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